

## Four modalities of single implant treatment in the anteriormaxilla: a clinical, radiographic and aesthetic evaluation

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Background: A number of single implant treatment modalities have been described, mainly depending on the bone support. However, it is difficult to compare the outcome of different treatment concepts based on the available literature. Indeed, heterogeneity in terms of care providers, implant system, biomaterials and follow-up may render any conclusion in this respect highly biased. In addition, aesthetic aspects of treatment outcome have been underexposed to research.

Aim: To document the outcome of single implants in the anterior maxilla following four routine treatment modalities when performed by experienced clinicians in daily practice using the same implant system and biomaterials.

Methods: A retrospective study in patients who had been treated by two periodontists and two prosthodontists in 2006 and 2007 was conducted. The four treatment modalities practically covered every clinical situation and included standard implant treatment (SIT), immediate implant treatment (IIT), implant treatment in conjunction with guided bone regeneration (GBR) and implant treatment in grafted bone harvested from the chin (BGR). Patients were clinically and radiographically examined. Complications were registered and the aesthetic outcome (Pink and White Esthetic Score) was rated. A blinded clinician who had not been involved in the treatment performed all evaluations.

Results: One hundred and four out of 115 eligible patients (44 SIT, 28 IIT, 18 GBR, 14 BGR) received at least one single NobelReplace tapered TiUnite<sup>®</sup> (Nobel Biocare, Go<sup>™</sup>teborg, Sweden) implant in the anterior maxilla and were available for evaluation. Clinical parameters (implant survival: 93%, plaque level: 24%, bleeding on probing: 33%, probing depth: 3.2mm) and bone level (1.19mm) did not differ significantly between treatment modalities. Postoperative complications were more common following GBR/BGR (> 61%) when compared with SIT/IIT (< 18%) ( $P < 0.001$ ). BGR was in 4/14 patients associated with permanent sensory complications at the donor site. Technical complications occurred in 9/104 patients. SIT and IIT showed similar soft tissue aesthetics (PES: 10.07 and 10.88, respectively), however major alveolar process deficiency was common (> 15%). PES was 9.65 for GBR. BGR showed inferior soft tissue aesthetics (PES: 9.00;  $P = 0.045$ ) and shorter distal papillae were found following GBR/BGR ( $P = 0.009$ ). Periodontal disease (OR: 13.0,  $P < 0.001$ ), GBR/BGR (OR: 4.3,  $P = 0.004$ ) and a thin-scalloped gingival biotype (OR: 3.7,  $P = 0.011$ ) increased the risk for incomplete distal papillae. WES was 7.98, all patients considered.

Conclusions and clinical implications: All treatment modalities were predictable from a clinical and radiographic point of view. However, advanced reconstructive surgery, especially BGR, increased the risk for complications and compromised aesthetics.

Research is required on the prevention and treatment of buccal bone defects at the time of tooth loss to avoid complex therapy.